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(71) Applicant(s)
Harold Keith Braid
The Sheilings, Main Street, Braceborough,
STAMFORD, Lincs, PE9 4NT, United Kingdom

(72) Inventor(s)
Harold Keith Braid
Stuart Graham Braid
Simon Christopher Braid

(74) Agent and/or Address for Service
Urquhart-Dykes & Lord
New Priestgate House, 57 Priestgate,
PETERBOROUGH, PE1 1JX, United Kingdom

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E1J JFA
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Online: WPI

(54) Tilt sash window system

(57) A tilt sash window system comprises a tiltable sash 14 connected by a stay 46 to a connector 50 slidable in a jamb channel 54 and connected to an end 38 of a counterbalance spring 42. Preferably the body 34 of the spring is fixedly mounted at the upper end of the jamb 24, and the connector is attached to the spring end by a quick-attach coupling. The stay effectively extends the spring while permitting the sash to tilt and counterbalancing it when tilted. The counterbalance spring can be relatively small in size due to the lengthening effect of the stay and is protected from dirt ingress by its location at the top of the jamb channel and its downwardly-facing attitude.

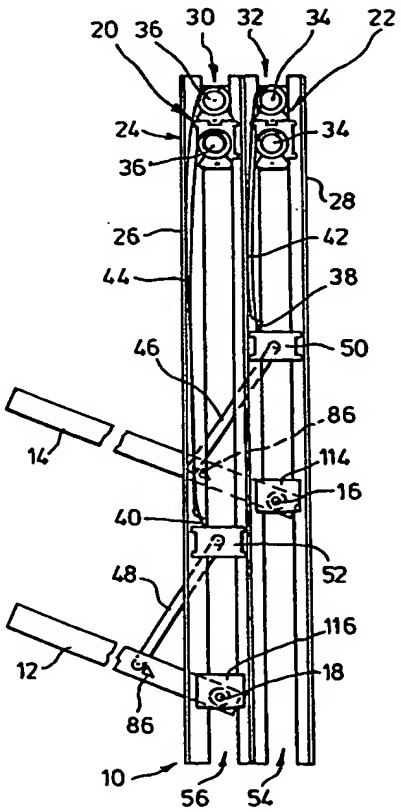

FIG.2

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

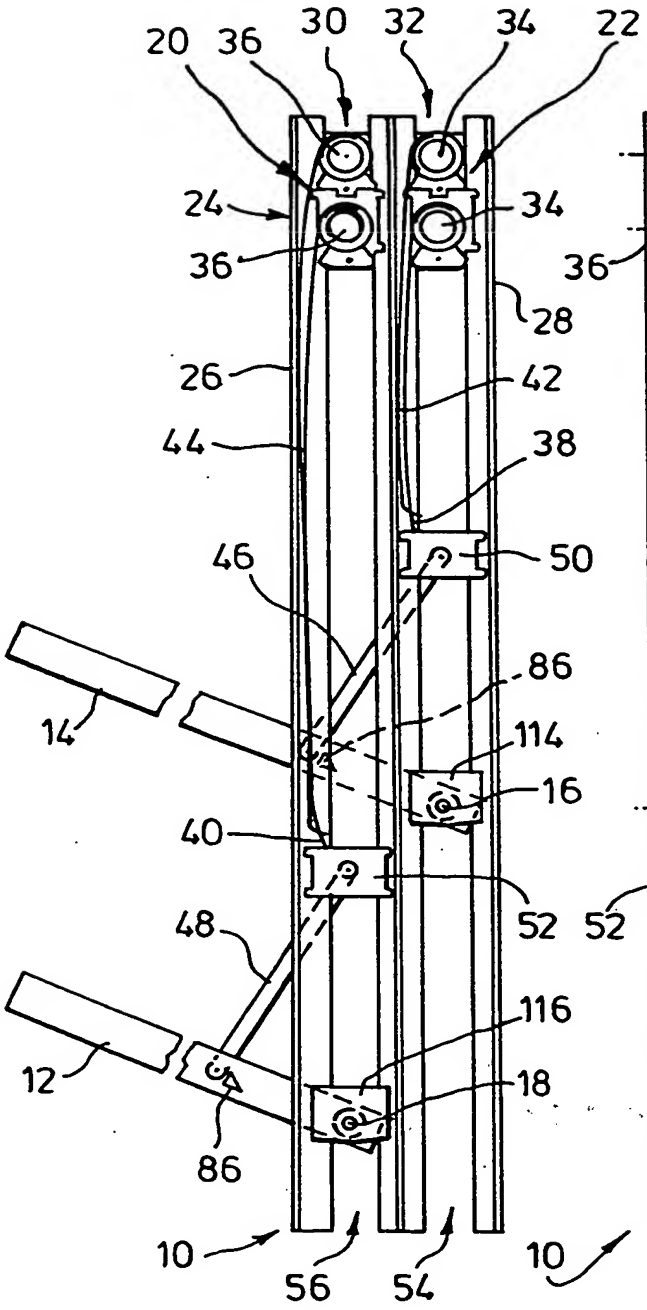
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FIG.2

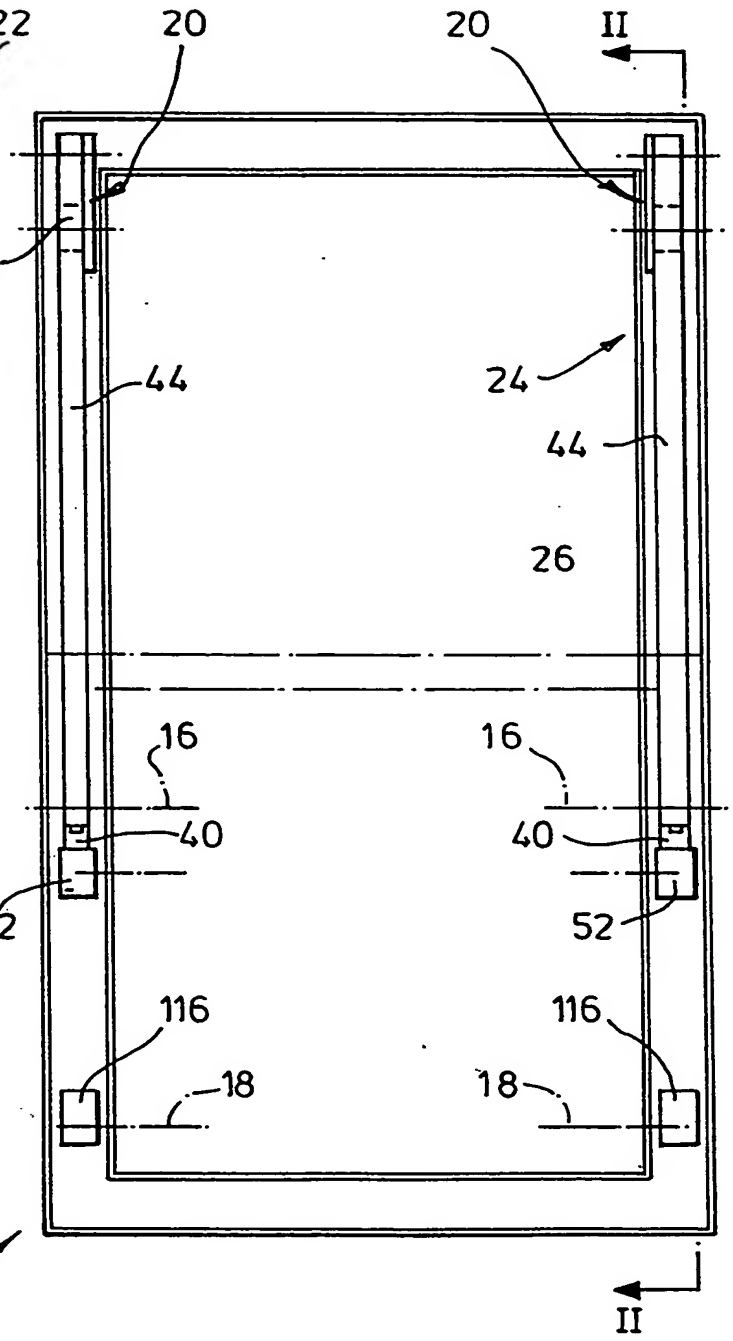
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FIG.1

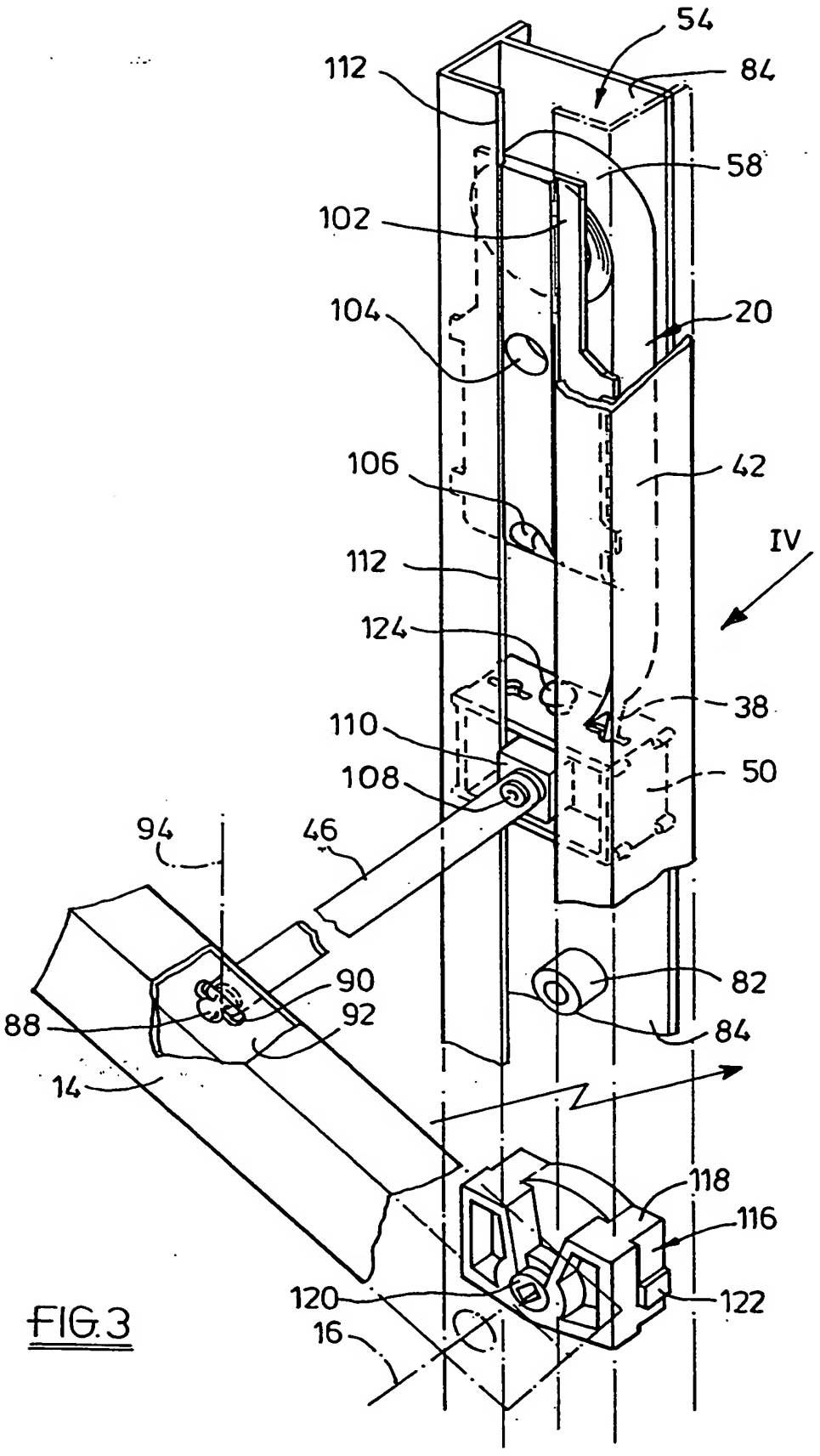
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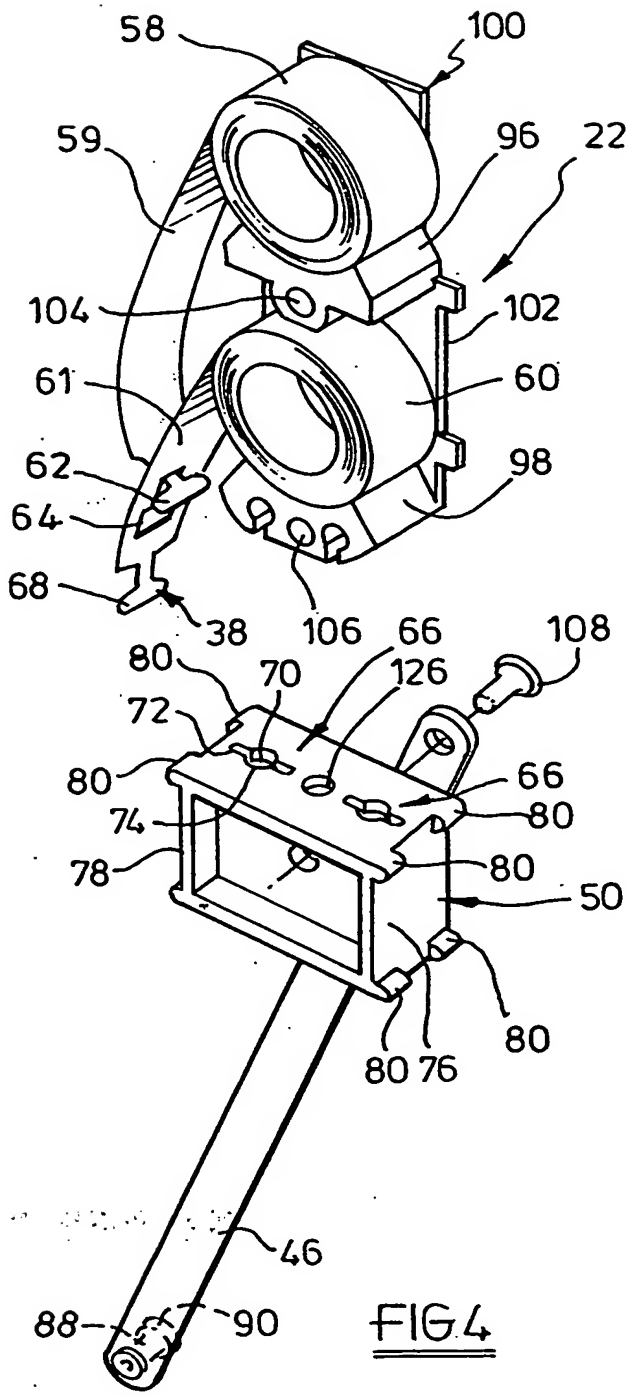
FIG.3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88
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FIG 4

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SASH WINDOW SYSTEMS

This invention relates to sash window systems. More specifically the invention relates to tilt sash window systems and spring systems therefor in which one or more of the sashes is capable of being tilted in order to permit it to be cleaned manually on both sides of the glass from one side of the sash assembly. Such arrangements are not new but currently available systems do not provide a satisfactory compromise between the desirable features.

Features of sash window systems which are desirable include :-

1 Convenient arrangements for counterbalancing the weight of the sashes by means of a spring system;

2 Convenient arrangements whereby the sashes can be tilted for cleaning purposes, usually inwardly with respect to the building;

3 Provision of sufficient sash travel to meet the egress requirements of users and/or regulatory requirements;

4 Reliability in use including, for example, ability to not become jammed by dust and dirt entering the system.

Prior systems have attempted to meet the requirements indicated above, or at least to meet an acceptable minimum of these but in practice the inter-related nature of these features has usually meant that while a given system may achieve one notable improvement or advantage, it is associated with a notable defect which seriously compromises the step forward.

Thus, for example, one recent third party prior system proposed an arrangement in which the sash

counterbalance springs were mounted for sliding movement in the jamb channel with the sliding sash. This provided the advantage that the ends of the springs could be simply fixed to the jamb channel to exert their tension load at the top of the channel. Thus, the top of the channel was relatively unobstructed and adequate egress provision could be made as well as providing for tipping of the sash for cleaning purposes in the usual way.

However, this arrangement was subject to the serious disadvantage that the location of the springs in the jamb channel above the sash pivot shoe left the springs exposed to dust and dirt entering the channel through its lengthwise slot and this had the result that, over a period of time, the dirt would enter the coiled springs and become trapped between the windings of these so that the springs effectively expanded, required more space and became jammed eventually in the jamb channels.

Moreover, this arrangement did not provide any convenient means for counterbalancing the offset weight of the tipped sash during cleaning operations.

Accordingly, a significant improvement would be provided if a tilt sash system could be provided in which the egress performance of such a previous system were available in combination with an ability to tilt for cleaning purposes while being less susceptible to dirt ingress and offering means for counterbalancing the overhung weight of the sash when tilted, or improvements in this regard.

There is disclosed in GB-A-2 262 123 (Nakanishi Engineering) a sash window counterbalance having, as shown in Fig 19, an arm 118 to retain a window sash 2

in its inwardly-swung position. The arm 118 acts between a sliding block 119 and the window sash 2. As shown in Fig 19, the attitude of arm 118 is such that it extends in a downward direction between its connection to the sash and its connection to sliding block 119, whereby it can be put in tension only by the window sash and not by the block. The arm serves merely to define the limit of the inwardly-swung position of the window sash.

According to the invention there is provided a tilt sash window system as defined in the accompanying claims.

In an embodiment a tilt sash window system has a counterbalance spring arrangement as follows. The spring system is provided with a stay which serves to connect the springs to the sash, whereby the spring or springs can be shorter in length than would otherwise be needed. The stay serves to transmit the entire counterbalance force from the spring to the sash. Therefore, the spring or springs can be correspondingly smaller in size and the space occupied by the spring or springs does not interfere significantly with egress requirements.

Moreover, by providing the spring-to-sash connection arrangement utilising a pivoted connection between the spring and the stay, the advantage is provided that the stay can pivot outwardly of the jamb channel so that the sash itself can likewise be counterbalanced when tilted for cleaning purposes.

Thus, this combination of features has already achieved the requirements of egress and ability to offset the tipped weight of the sash.

Additionally, because the spring arrangement is such that the stay-lengthened springs can be mounted with the main bodies of the springs at the top of the jamb channel, this location of the springs produces the benefit that the springs are automatically protected by the top of the jamb channel from the ingress of dirt. Additionally, the springs have their spring construction so disposed that the inwardly-tapering nip or angle between the coils of the spring and the extending leaf is facing downwards in the jamb channel, whereby the opportunity for the entry of dirt into the spring is negligible,

In the described embodiment the counterbalance spring means has its body portion adapted to be mounted at a fixed location in the region of the upper end of the jamb structure, with the extensible spring leaf portion extending downwardly for connection to the slidable sash. As indicated above, this provides protection from the ingress of dirt. The stay means interconnects the spring end and the slidable sash to transmit the entire counterbalance force from the spring to the sash. A connector is provided which is adapted to be slidably located in the jamb channel to provide a connection between the spring end and the stay. The stay is pivotally connected to the connector. This pivotal connection is provided at one side of the connector, and further provision is made for the spring end to be connected to an upper portion of the connector. For the purpose of the pivotal connection of the stay to the connector, a formation is provided on the connector at one side thereof and is adapted to project into a lengthwise and upwardly extending slot provided in the jamb channel to receive the pivot means for the tilt sash.

In this way the forces applied to the connector

by the stay and by the spring end are caused to be applied in such a way that any imbalance of the forces applied to the connector is offset firstly by the sliding location of the projecting formation on the connector, which is received in the slot in the jamb channel, and secondly by the corresponding sliding location of the main surfaces of the connector in the jamb channel itself.

As regards the connection of the constant force springs in the embodiment to the sliding connectors, and thus to the stays, this is effected by providing a receptor structure on each connector to receive its spring end. This receptor structure defines an opening adapted to receive an end formation on the spring end. The end formation is receivable only in a defined attitude thereof with respect to the connector, this attitude being inclined with respect to the attitude naturally adopted by the spring end when the spring is mounted in its working position. As a result, the spring end is automatically retained in captive interconnected engagement with the connector.

Likewise in the embodiment, the connector is a free sliding fit in the jamb channel and has, or at least two oppositely-facing surfaces of the connector have, bearing means for sliding engagement with the corresponding surfaces of the jamb channels. Such bearing means may comprise, for example, moulded plastics bearing elements providing slightly raised curved smooth bearing surfaces at the regions of the opposite ends of the connector structure.

To limit the tilting movement of the sliding sash when opened for cleaning, there is provided stop

means. In one embodiment stop members are mounted on the sliding sash itself for engagement with the stay members to limit pivotal movement thereof with respect to the sash. In another embodiment the stop members are adapted to be mounted in the jamb channel to control downward sliding movement of the connectors. The geometry may be such that the sash can be caused to tilt further to an over-centre position in which the sash is more accesible for cleaning purposes.

A safety feature of the embodiments described is provided in the method of connecting said stay members to the sliding sash. For this purpose the connection is effected by means of a pivot member provided on the stay end and the pivot member having an end formation to be received in a correspondingly-shaped opening formed in the sash. The arrangement is such that the end formation is receivable and removable from the opening in one attitude of the sash and not in others, and the arrangement is likewise such that this attitude is displaced from that of the stay in the normal non-tilted attitude of the sash and likewise from the stay attitude in the normal tilted attitude of the sash, whereby accidental disengagement is avoided. Preferably, the attitude for disengagement is one which needs to be specifically adopted and would not normally be encountered in use.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which :-

Fig 1 shows an elevation view of the frame of a tilt sash window assembly as viewed from the inside of the corresponding building and with (for clarity of illustration) the inner wall of the jamb channels of

the frame shown removed in order to indicate the location of some of the principal components of the sash counterbalance spring system and the sash pivot/brake shoes, but with the sliding sashes themselves and the stays connecting them to the springs (which are clearly seen in Fig 2) not shown for simplicity of illustration;

Fig 2 shows a section through the tilt sash window system frame of Fig 1 taken on the line II-II in Fig 1, and with the tilt sash windows shown in their tilted positions, together with their associated stays;

Fig 3 shows a perspective view on a larger scale of one of the two jamb channels seen in Fig 2 and with details of the sash suspension system for this; and

Fig 4 shows, on a larger scale, a perspective view of part of the sash suspension system of Fig 3 including the two interconnected constant force springs, an associated connector, and the stay which pivotally interconnects the connector and the sash.

As shown in the drawings, a tilt sash window system 10 comprises twin tiltable sashes 12, 14 which are tiltable about respective tilt axes 16, 18.

For each of the sashes 12 and 14 there is provided counterbalance spring means 20, 22, these being adapted, in each case, to act between the respective slidable sash 12 or 14 and the jamb structure 24 located alongside the slidable sashes and providing respective jamb channels 26, 28 in which the components of the sash suspension systems 30, 32 (to be more fully described below) are mounted.

As shown in Figs 1 and 2, the coiled counterbalance spring means 20, 22 each have their

twin spring body portions 34,34 and 36,36 (as opposed to their free spring ends 38, 40) mounted at fixed locations at the upper end of jamb structure 24, with the twin extensible spring leaf portions 42, 44 extending downwardly therefrom for connection to the respective slidable sashes 12 and 14, as described below.

As can be clearly seen from Fig 1, the slidable sashes 12 and 14 are each mounted for sliding movement and are each likewise counterbalanced by their respective sash suspension systems at both lateral sides of the tiltable sashes 12 and 14.

Fig 2 shows only one side of the sash suspension arrangement. Fig 1 shows both sides, that on the left hand side in Fig 1 corresponding to that on the right, and this latter being the part which is also seen in Fig 2.

As best seen in Figs 2, 3 and 4, stay means 46, 48 is provided to interconnect the spring ends 38 and 40 and the slidable sashes 12 and 14 to provide the sole connection therebetween for the application of the spring counterbalance force. For this purpose, connectors 50, 52 are provided in the jamb channels 54, 56 to provide a connection between the spring ends 38, 40 and the stays 46, 48. The connectors are slidably located in the jamb channels and have the stays pivotally connected thereto at one side of each connector, with the spring ends connected to the upper faces of the connectors.

The structure of the counterbalance spring means 20, 22 is shown in more detail in Fig 4, which shows spring means 20. The twin constant force coiled

springs 58, 60 are generally as disclosed in US 5,232,208 (Braid et al) which discloses a system enabling such springs to be used in multiples so as to counterbalance sash windows of varying weight, but in this case the springs are shorter in length, by virtue of the use of stays 46, 48.

In the present embodiment, as shown in Fig 4, upper spring 58 has an extensible leaf 59 which is connected to the corresponding leaf 61 of lower spring 60 by means of a spring end formation 62 on upper spring leaf 59 which is in the form of a hammerhead and which locates through a correspondingly-shaped opening 64 formed in the region of the free end of lower spring 60. Spring 60 has a spring end 38, as described above, for connection to connector 50, as will be more fully described below. The details of the interconnection of springs 58 and 60, as shown in Fig 4, are not repeated in Fig 3, for simplicity of illustration.

Details of the connection of spring means 22 to connector 50 will now be described with reference to Fig 4.

As shown in Fig 4, connector 50, which is a plastics moulding, is formed so as to provide two receptor structures 66,66 to receive and locate an end formation 68 in the form of a hammerhead provided at spring end 38. Receptor structure 66 defines an opening 70 including a slot portion 72 and a central enlargement 74 so that hammerhead end formation 68 can be received in opening 70 when the hammerhead is placed in slot 72 during assembly. When the spring assembly is mounted in its working attitude as shown in Fig 4, the spring end reverts to the attitude shown

in Fig 4 whereby it is retained in captive interconnected engagement with connector 50.

Connector 50 is formed as a rectangular plastics moulding and constructed so as to be a free sliding fit in the respective jamb channel 54, 56 and has on its oppositely facing side faces 76, 78 curved convex bearing means 80 for sliding engagement with the corresponding inner surfaces of the jamb channels. The bearing means 80 are provided in the form of rounded bearing elements, integral with the body of the connector and serving to reduce the frictional contact surface area thereof.

In order to control the tilting movement of sashes 12 and 14, stop means is provided. Such stop means may be either in the form shown in Fig 3 where a stop member 82 in the form of a rubber buffer is secured in jamb channel 54 for engagement with and to limit the downward travel of connector 50. When connector 50 engages stop member 82, its downward movement is stopped and accordingly outward angular movement of tiltable sash 12 is controlled. The stop member is secured by any suitable fastener to the rear face 84 of jamb channel 54. By designing the geometry of the tilt sash accordingly it may be arranged that the sash can be caused to tilt further to an over-centre position in which the sash is more accessible for cleaning. This is done by applying light pressure on sash 12 or sash 14 so that brake shoe 116 can be made to ride up in its channel 54 or 56. The sash can in this way be caused to adopt any choosen attitude up to its limiting end position.

In the embodiment of Fig 2, the stop member is shown at 86 in the form of a hardened plastics member

fixed to the sash side face and having a stop face positioned and profiled for engagement with the under edge of the respective stay 46 or 48. This stop member likewise limits the downward angular movement of the tiltable sashes by limiting the corresponding angular movement of the stays relative thereto.

Turning now to the method for interconnecting stays 46 and 48 with their respective sashes 12 and 14, the details of this are shown in Fig 3. Each stay has a laterally-extending pivot member 88 in the form of a short pivot rod having an end formation 90 adapted to be received in a correspondingly-shaped opening formed in the side face 92 of the respective sash 12 or 14. In Fig 3, there is shown at 94 a reference line indicating the attitude of a slot formed in side face 92 to receive the end formation 90 only when the latter is aligned with slot 94. This is arranged to be when sash 12 is at an attitude only slightly outwardly of its vertical position during normal use of the sash prior to inward tipping for cleaning purposes.

Further details of the sash window system shown in the drawings will now be described. The majority of the components of the system are formed as plastics mouldings, including the jamb channels 54, 56 themselves. Details of the structure of the springs 58 and 60 are to be found in our above-mentioned prior US patent. The springs are mounted on respective seats 96, 98 forming part of a common spring mounting structure 100 including a mounting plate 102 formed with apertures 104, 106 for fasteners (not shown) to fix these in position.

Stays 46 and 48 are pivotally connected to

connectors 50, 52 by respective rivets. One of these, 108 is shown in Figs 3 and 4 and is received in a formation 110 which projects laterally from the side face of connector 50 to be received in the slot 112 formed in jamb channel 54 which serves also to permit the vertical movement of the pivotal connection between the sliding sashes 12 and 14 and their respective pivot and brake shoes 114, 116. The construction and arrangement of the brake shoes will not be described in detail as these products are available commercially and well known to persons skilled in the art. It suffices to say that, as shown in Fig 3, the pivot and brake shoes comprise a plastics moulding 118 which receives in a slotted rotatable bearing member 120 a pivot bar (not shown) projecting from the side face of the tiltable sash 12 (or 14). Tilting of the latter from its upright position causers the bearing member to activate brake elements 122 which grip opposite side faces of the jamb channel.

Also shown in Fig 3 is a resilient buffer 124 in the form of a doomed elastomeric mushroom member having a shank which is a push fit into an aperture 126 formed in the upper face of connector 50. Similar provision is made in the other connector members. The buffer serves to reduce the effect of an impact between the connector 50 and the spring means 20.

In use, the system operates generally as follows.

Spring means 20, 22 exert an upthrust on connectors 50, 52. In the closed and upright position of sashes 12 and 14, this upthrust is transmitted directly vertically downwards through stays 46, 48 to the sashes 12, 14 themselves. When the latter are

released for cleaning or other purposes to the tilted positions shown in Figs 2 and 3 the counterbalancing forces are still applied thereto, though at an offset angle. The sashes' angular outward movement is controlled by the stops 82 or 86. After cleaning, the sashes are returned to their upright attitude and retained therein by manually releasable catches (not shown) at the upper region of the sashes. These engage with the slots 112 formed in the jamb channels.

CLAIMS :-

1 A tilt sash window system comprising :-

a) a slidable sash tiltable about a tilt axis;

b) counterbalance spring means for said sash;

c) said counterbalance spring means being adapted to act between said slidable sash and a jamb structure alongside said slidable sash;

characterised by

d) said counterbalance spring means having its body portion adapted to be mounted at a fixed location on said jamb structure, with the extensible spring end portion thereof extending downwardly therefrom for connection to said slidable sash;

e) stay means being provided to interconnect said spring end and said slidable sash; and

f) a connector being provided which is adapted to be slidably located in said jamb channel to provide a connection between said spring end and said stay, and said stay being pivotally connected to said connector.

2 A tilt sash window system characterised by counterbalance stay means adapted to pivotally interconnect a tiltable sash and a sliding connector in a jamb channel for the transmission of spring forces, said connector being attachable to the free end of the sash counterbalance spring.

3 A sash suspension system adapted for use in a tilt sash window system according to claim 1 or claim 2, said sash suspension system comprising the combination of said spring means and said connector and said stay means.

4 A tilt sash window system according to any preceding claim characterised by said counterbalance spring means being adapted to be mounted at said fixed

location at an upper end of said jamb structure.

5 A tilt sash window system according to claim 1 or claim 4 characterised by said connector having said pivotal connection of said stay provided at (in use) one side of said connector and provision being made for said spring end to be connected at (in use) an upper portion of said connector.

6 A tilt sash window system according to claim 5 characterised by said pivotal connection of said stay to said connector at said one side being by means of a formation provided on said connector at said one side and said formation being adapted to project into a lengthwise and upwardly extending slot provided in said jamb channel to receive pivot means for said tilt sash.

7 A tilt sash window system according to claim 5 characterised by said provision for connection of said spring end comprising provision of a receptor structure to receive and locate an end formation on said spring end.

8 A tilt sash window system according to claim 7 characterised by said receptor structure comprising structure defining an opening adapted to receive said end formation of said spring end only in a defined attitude thereof, and said defined attitude being (in use) inclined with respect to the attitude (in use) adopted by said spring end, whereby (in use) said spring end is retained in captive interconnected engagement with said connector.

9 A tilt sash window system according to any preceding claim characterised by said connector being constructed to be a free sliding fit in said jamb channel and having, on at least two oppositely-facing surfaces

thereof, bearing means for sliding engagement with the corresponding surfaces of said jamb channels.

10 A tilt sash window system according to any preceding claim characterised by stop means to limit tilting movement of said sliding sash by engagement of structure associated with said sliding sash with said stop means to control said tilting movement of said sash.

11 A tilt sash window system according to claim 10 characterised by said stop means comprising a stop member mounted on said sliding sash for engagement with said stay member to control pivotal movement thereof with respect to said sash.

12 A tilt sash window system according to claim 10 characterised by said stop means comprising a stop member adapted to be mounted in said jamb channel to control downward sliding of said connector.

13 A tilt sash window system according to any preceding claim characterised by said stay means comprising a lengthwise-extending stay member adapted to extend lengthwise of said jamb channel during non-tilting use of said sliding sash, and said stay member being adapted for connection to said sash by a pivot member incorporating an end formation thereon and adapted to be received in a correspondingly-shaped opening formed in said sash, the arrangement being such that said end formation is receivable in and removable from said opening in one attitude of said sash and not in others, said one attitude being displaced from the normal operating (non-tilted) attitude of said sash and also displaced from the tilted attitude thereof.

14 A tilt sash window system substantially as

described herein with reference to the accompanying drawings.

Patents Act 1977 Examiner's report to the Comptroller under Section 17 (The Search report)	Application number GB 9523557.8
Relevant Technical Fields (i) UK Cl (Ed.N) E1J (JFA) (ii) Int Cl (Ed.6) E05D (13/00); E05F (1/16); E06B (3/44)	Search Examiner MRS GILL WHITFIELD Date of completion of Search 2 JANUARY 1996
Databases (see below) (i) UK Patent Office collections of GB, EP, WO and US patent specifications. (ii) ONLINE: WPI	Documents considered relevant following a search in respect of Claims :- 1-14

Categories of documents

X:	Document indicating lack of novelty or of inventive step.	P:	Document published on or after the declared priority date but before the filing date of the present application.
Y:	Document indicating lack of inventive step if combined with one or more other documents of the same category.	E:	Patent document published on or after, but with priority date earlier than, the filing date of the present application.
A:	Document indicating technological background and/or state of the art.	&:	Member of the same patent family; corresponding document.

Category	Identity of document and relevant passages		Relevant to claim(s)
A	GB 2262123 A	(KABUSHIKI KAISHA NAKANISHI ENGINEERING) see especially Figures 18, 19	
A	US 5232208 A	(BRAID et al) see especially Figure 1	

Databases:The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).